

## CLAIMS

1. A method for producing a capacitor comprising,  
as one electrode (anode), an electric conductor having  
5 pores and having formed on the surface thereof a dielectric  
layer and, as the other electrode (cathode), a  
semiconductor layer formed on the electric conductor by  
energization in an electrolytic solution, the method  
comprising impregnating pores with a semiconductor layer-  
10 forming precursor before energization to render the  
concentration of semiconductor layer-forming precursor in  
pores higher than that of semiconductor layer-forming  
precursor in the electrolytic solution.

15 2. The method for producing a capacitor as claimed  
in claim 1, wherein the electrolytic solution is an  
electrolytic solution not containing a semiconductor layer-  
forming precursor.

20 3. The method for producing a capacitor as claimed  
in claim 1, wherein the electric conductor is at least one  
member selected from a metal, an inorganic semiconductor,  
an organic semiconductor and carbon or a mixture thereof.

25 4. The method for producing a capacitor as claimed  
in claim 1, wherein the electric conductor is a laminated  
body having, as the surface layer, at least one member  
selected from a metal, an inorganic semiconductor, an  
organic semiconductor and carbon, or a mixture thereof.

5        5.        The method for producing a capacitor as claimed  
in claim 3 or 4, wherein the electric conductor is a metal  
or alloy mainly comprising at least one member selected  
from tantalum, niobium and aluminum, or a niobium oxide.

10        6.        The method for producing a capacitor as claimed  
in claim 1, wherein the electric conductor is tantalum  
having a CV value of 100,000  $\mu\text{F}\cdot\text{V/g}$  or more.

15        7.        The method for producing a capacitor as claimed  
in claim 1, wherein the electric conductor is niobium  
having a CV value of 150,000  $\mu\text{F}\cdot\text{V/g}$  or more.

20        8.        The method for producing a capacitor as claimed  
in any one of claims 1 or 3 to 7, wherein the electric  
conductor has a size of 5  $\text{mm}^3$  or more.

25        9.        The method for producing a capacitor as claimed  
in any one of claims 1 or 3 to 8 above, wherein the  
electric conductor has a foil shape and the depth of pore  
formed by etching is 200  $\mu\text{m}$  or more.

30        10.       The method for producing a capacitor as claimed  
in claim 1, wherein the dielectric layer mainly comprises  
at least one member selected from metal oxides such as  
 $\text{Ta}_2\text{O}_5$ ,  $\text{Al}_2\text{O}_3$ ,  $\text{TiO}_2$  and  $\text{Nb}_2\text{O}_5$ .

35        11.       The method for producing a capacitor as claimed

in claim 1 or 2, wherein the semiconductor layer-forming precursor is at least one member selected from an aniline derivative (raw material of polyaniline), a phenol derivative (raw material of polyoxyphenylene), a thiophenol derivative (raw material of polyphenylene sulfide), a thiophene derivative (raw material of polythiophene), a furan derivative (raw material of polyfuran) and a pyrrole derivative (raw material of polypyrrole or polymethylpyrrole).

10

12. The method for producing a capacitor as claimed in claim 11, wherein the semiconductor layer-forming precursor is pyrrole or 3,4-ethylenedioxythiophene.

15

13. The method for producing a capacitor as claimed in claim 1 or 2, wherein the semiconductor layer-forming precursor is a compound which is oxidized or reduced by energization and becomes an inorganic semiconductor.

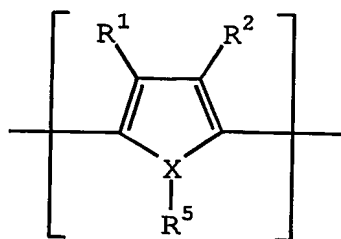
20

14. The method for producing a capacitor as claimed in claim 1, wherein the semiconductor layer is at least one member selected from an organic semiconductor layer and an inorganic semiconductor layer.

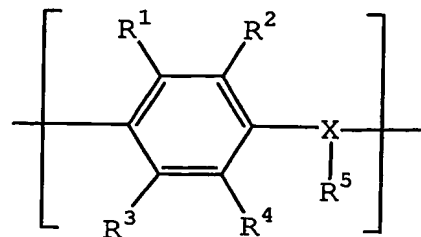
25

15. The method for producing a capacitor as claimed in claim 14, wherein the organic semiconductor is at least one member selected from an organic semiconductor comprising benzopyrroline tetramer and chloranil, an organic semiconductor mainly comprising tetrathiotetracene,

an organic semiconductor mainly comprising tetracyano-quinodimethane, and an organic semiconductor mainly comprising an electrically conducting polymer obtained by doping a dopant into a polymer containing a repeating unit  
 5 represented by the following formula (1) or (2):



(1)

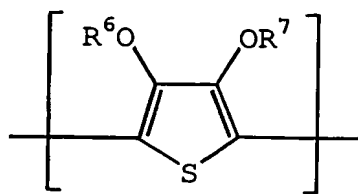


(2)

wherein R<sup>1</sup> to R<sup>4</sup> each independently represents a hydrogen atom, an alkyl group having from 1 to 6 carbon atoms or an alkoxy group having from 1 to 6 carbon atoms, X represents  
 10 an oxygen atom, a sulfur atom or a nitrogen atom, R<sup>5</sup> is present only when X is a nitrogen atom, and represents a hydrogen atom or an alkyl group having from 1 to 6 carbon atoms, and each of the pairs of R<sup>1</sup> and R<sup>2</sup>, and R<sup>3</sup> and R<sup>4</sup> may combine with each other to form a cyclic structure.

15

16. The method for producing a capacitor as claimed in claim 15, wherein the electrically conducting polymer containing a repeating unit represented by formula (1) is an electrically conducting polymer containing a structure  
 20 unit represented by the following formula (3) as a repeating unit:



(3)

wherein R<sup>6</sup> and R<sup>7</sup> each independently represents a hydrogen atom, a linear or branched, saturated or unsaturated alkyl group having from 1 to 6 carbon atoms, or a substituent for forming at least one 5-, 6- or 7-membered saturated hydrocarbon cyclic structure containing two oxygen atoms when the alkyl groups are combined with each other at an arbitrary position, and the cyclic structure includes a structure having a vinylene bond which may be substituted, and a phenylene structure which may be substituted.

17. The method for producing a capacitor as claimed in claim 16, wherein the electrically conducting polymer is selected from polyaniline, polyoxyphenylene, polyphenylene sulfide, polythiophene, polyfuran, pyrrole, polymethylpyrrole, and substitution derivatives and copolymers thereof.

18. The method for producing a capacitor as claimed in claim 17, wherein the electrically conducting polymer is poly(3,4-ethylenedioxythiophene).

19. The method for producing a capacitor as claimed in claim 14, wherein the inorganic semiconductor is at least one compound selected from molybdenum dioxide,

tungsten dioxide, lead dioxide and manganese dioxide.

20. The method for producing a capacitor as claimed  
in any one of claims 14 to 19, wherein the electrical  
5 conductivity of the semiconductor is from  $10^{-2}$  to  $10^3$  S/cm.

21. A capacitor produced by the production method  
claimed in any one of claims 1 to 20.

10 22. The capacitor as claimed in claim 21, wherein  
the impregnation ratio of the semiconductor is 90% or more.

23. An electronic circuit using the capacitor  
claimed in claim 21 or 22.

15

24. An electronic device using the capacitor  
claimed in claim 21 or 22.